

The following table will serve to show how *Sc. valida*, Lucas, may be distinguished from the allied South-American species, which agree with it in possessing spines upon the femora of the nineteenth and twentieth pairs of legs and a deep transverse furrow upon the first dorsal plate:—

- A. Sternites smooth, not bisulcated; patellæ of anal legs armed with spines *prasina*, C. Koch.
S. Amer.
- B. Sternites bisulcated.
- a. Last tergite with a median longitudinal crest *viridicornis*, Newp.
S. Amer.
- b. Last tergite without a median longitudinal crest.
- a. Femora of all the legs armed; patella of anal leg armed *gigas*, Leach. S.
Amer.
- b. Femora of nineteenth and twentieth pairs of legs armed; patella of anal leg unarmed *valida*, Lucas. N.
Afr.
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XLI.—On the Survival of Spongillæ after the Development of Swarm-larvæ. By M. WELTNER*.

THE assertion made by Laurent (1844) that our freshwater sponges perish after the development of swarm-larvæ was disputed by Lieberkühn (1857). Marshall (1884) supposes that there is an alternation of generations in *Spongilla lacustris*. From the gemmulæ which live through the winter there originate in the spring male and female *Spongillæ* which fertilize one another. The males die after the development of the semen; the females, after the coming forth of the larvæ, become neuters and perish in the autumn with formation of gemmules. The offspring of the male and female specimens remain neuters in the first year and likewise break up into gemmules in the autumn.

Götte (1886), on the contrary, is of opinion that reproduction universally causes the death not only of the *Spongillæ*, but of sponges in general. The parts affected by the repro-

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duction first perish, so that a successive dying-off is observed. Hence it happens that we find sponges containing larvæ or gemmules the exterior of which may appear quite healthy, while the inner parts are already in course of breaking down by the development of the germ-materials, or already quite destroyed. Götte further explains those cases in which, in spring and summer, we find perfectly developed gemmules, together with ova or semen, by the supposition that in them the germ-formation taking place in the preceding autumn was prematurely interrupted, and the sponge hibernated with the gemmules sticking in its soft parts.

At a former meeting (21st December, 1886) I noticed the freshwater sponges living in the Spree and in the Tegelsee, and stated that *Ephydatia fluviatilis* living in the Tegelsee never forms gemmules there, but is perennial. This sponge is therefore a favourable object for deciding the question as to the duration of the life of this species and testing the correctness of the opinion of Laurent and Götte of the death of the *Spongille* through sexual reproduction.

During the last three winters I have kept large and small (*i. e.* down to 1 centim.) specimens of the above-mentioned species from October to March, May and June, in aquaria, some standing in heated, others in unwarmed rooms. A part of them, and especially all the larger specimens, have always perished in course of time. In many of the smaller ones, however, the original size became considerably diminished, as in the case of the larger specimens; here also the outer membrane became closely applied to the sponge-body or disappeared altogether; here also the points of the bundles of spicules projected more or less; but the efferent canal only disappeared in a part of them. The others almost constantly showed an osculum upon each sponge; the presence of an external membrane closely applied to it was ascertained under the microscope, and the current of water flowing through the *Spongilla* was demonstrated. These little sponges lived longest, but they also perished in May and June.

The dying off of the *Spongillæ* observed in the aquarium appears, however, to occur by no means so frequently in nature. Every one who has kept freshwater sponges in aquaria knows how difficult it is to keep even small specimens alive for a few months. On the other hand this is easily done (see Lieberkühn and Götte), as I have also observed, with young *Spongillæ* reared from larvæ. It was only after many attempts that I succeeded in realizing, at least approximately, the conditions which are necessary for the prosperity of larger specimens. My failures in past years in attempting

to keep perennial freshwater sponges from the autumn to the middle of the summer I ascribe chiefly to want of nourishment. We know almost nothing of the food of the *Spongillæ*.

On the 16th October of last year I again obtained six large specimens of *Ephydatia fluviatilis* from the Tegelsee. The smallest of these sponges measured $5\frac{1}{2}$ centim. in length, the largest 10 centim.; the thickness of these crusts was $2\frac{1}{2}$ millim. in the smallest and nearly 5 millim. in the largest specimen. All the six were examined for ova, segmentation-stages, and larvæ in the most different parts of their bodies (at this season there is no longer any semen). Four were neuters, and will be no further referred to. The two others were female, and, as I expressly note, completely filled with segmentation-stages and larvæ. These two specimens were placed in large aquaria containing 3-4 litres of water *, into which I had previously put sand and *Elodeæ*. The glass vessels were disturbed as little as possible and stood in an unwarmed room of the Zoological Museum. During the whole time the water was only once changed, and this quite at the commencement. From these two sponges larvæ swarmed uninterruptedly from the 16th October onwards; the last free-swimming larvæ were observed on the 30th October. One of these *Spongillæ* constantly showed three large excurrent tubes and began in December gradually to diminish in volume; the derm and oscula first disappeared and the points of the spicules projected freely. On the 2nd January the temperature of the water in this vessel, which stood close to the window, had fallen below 32° F., and when the vessel was turned for observation the water all at once became solidified in large leaves down to the sponge, which was in the middle. Both aquaria were then brought into a place situated between two warmed chambers. The sponge just described did not, however, recover; it is now much reduced, nearly the whole skeleton lies bare, in two places the derm stands off in the form of large closed bladders, and in the upper part of the sponge there is only a minute osculum.

The other of the two larva-bearing *Spongillæ* constantly changed the number and position of its oscular tubes during the first month of its residence in the aquarium; from the 16th November onwards, when a passing frost occurred, it showed only a few oscula, and from the 10th December the number and position of the two excurrent tubes remained

* The water was derived from the local water-supply, which receives its water from the Tegelsee.

constant until the 1st February. On this and the following day the window of the room was left open at night, the temperature of the water had fallen in the morning nearly to 32° F., and the two oscular tubes had completely disappeared on the morning of the third day. But within a day, the window having been again closed, the oscula reappeared at the same place and again showed the same size. Besides these the sponge has now a third excurrent orifice. This *Spongilla* has also become smaller since it was brought from Tegel; it measured originally 10 centim. in length and nearly 5 millim. in the thickness of its crust; its length is now only 9 centim., with a thickness of 2½ millim. At one place the spicular web, deprived of its soft parts, lies upon the parenchyma of the sponge; on all the rest of the surface we can indeed with the lens see the points of the spicules projecting, but almost everywhere the outer membrane may be seen closely applied to the sponge. In other respects the *Spongilla* presents a perfectly fresh appearance and emits from all the three oscular apertures a quick current of water. Upon the alteration of the soft-body of *Ephydatia fluviatilis* after the time of reproduction and until its recurrence in the following year I shall report in another place. Only this may be stated, that, in opposition to the statements of Lieberkühn and Metschnikoff, neither the dermis nor the excurrent tubes, nor the flagellate chambers and canals, completely disappear in the perennial sponges of the Tegelsee.

From this experiment in keeping alive a decidedly female *Spongilla* for nearly four months after the issue of the last larva it certainly follows that the notion of Laurent and Götte as to the death of the *Spongillæ* in consequence of sexual reproduction is not correct in all cases. On the other hand, I agree perfectly with Götte that in *Ephydatia fluviatilis* "there can be no question of a decided seasonal difference, or of a true alternation of generations," such as occurs, according to Marshall, in *Spongilla lacustris*.

XLII.—*Descriptions of new Reptiles and Batrachians obtained by Mr. H. O. Forbes in New Guinea.* By G. A. BOULENGER.

Lygosoma Forbesii.

Section *Homolepida*. Body rather elongate, limbs short;